Blended Learning for Academic Resilience in Times of Disaster or Crisis

Julie Mackey
Senior Lecturer
School of Literacies and Arts in Education
University of Canterbury
Christchurch NEW ZEALAND
julie.mackey@canterbury.ac.nz

Fiona Gilmore
Lecturer
School of Literacies and Arts in Education
University of Canterbury
Christchurch NEW ZEALAND
fiona.gilmore@canterbury.ac.nz

Nicki Dabner
Senior Lecturer
School of Literacies and Arts in Education
University of Canterbury
Christchurch NEW ZEALAND
nicki.dabner@canterbury.ac.nz

Des Breeze
Lecturer
School of Literacies and Arts in Education
University of Canterbury
Christchurch NEW ZEALAND
des.breeze@canterbury.ac.nz

Philippa Buckley
Lecturer
School of Literacies and Arts in Education
University of Canterbury
Christchurch NEW ZEALAND
philippa.buckley@canterbury.ac.nz

Abstract

Blended learning can provide academic resilience in times of natural disaster, civil emergency, and crisis. While blended pedagogies are widely used in tertiary settings, very little has been written about the role of blended learning in times of crisis, or the pedagogical challenges of rapid course redesign to mitigate disruptive circumstances. This case study describes the immediate post-earthquake challenges of redesigning courses using different blends of face-to-face and online activities to meet the needs of on-campus, regional campus, and distance pre-service teacher education students. The research question asked, "What can be learned from the experiences of academic staff directly involved in the adaptation and redesign of blended courses in a time of disaster?" This descriptive case study employed quick-response research strategies to gather time-sensitive data while it was fresh in the minds of the participants. This article discusses key findings and concludes with recommendations to assist program and course leaders to prepare in advance for resilient blended learning in times of natural disaster, crisis, and emergency.

Keywords: blended learning, disaster planning, emergency response

Introduction

This article reports on the use of blended learning to mitigate the disruptive effects of a series of major earthquakes in the Canterbury region of New Zealand during 2010 and 2011. The overarching research question investigated was:

> *What has the Canterbury earthquake experience taught us in relation to designing resilient blended learning?*

The events that prompted the study began with a 7.1-magnitude earthquake in September 2010, followed by a devastating 6.3-magnitude shake in February 2011 and ongoing large aftershocks throughout 2011. The February quake resulted in 185 fatalities, large-scale destruction in the city, and a prolonged state of civil emergency.

Fortunately, no buildings collapsed and no serious injuries occurred on the University of Canterbury (UC) campus, situated several kilometers from the central city. Emergency management protocols ensured that the campus was evacuated safely and closed while rigorous engineering assessments and emergency repairs were being carried out. Full remediation will take several years. When the campus reopened three weeks later, physical teaching spaces were in short supply, and some lectures were held in tents or local halls, with timetables revised weekly to maximize use of available facilities.

While the campus was closed, College of Education staff began to revise teaching strategies because it was very apparent that normal teaching methods were not viable, and that innovation was required. In many respects the College of Education was well equipped through its existing infrastructure, pedagogy, and capability to support new blends of teaching and learning. As a pioneer in distance learning in New Zealand, the College had developed considerable capability and expertise in online and blended learning, including strong bi-cultural understandings and strategies (Needham, Hunt, & McMurray, 2011). Prior to the earthquakes every course already had some web support, with many lecturers making extensive use of the learning management system (LMS) for initial teacher education and postgraduate courses.

Furthermore, an initiative to revitalize flexible learning options for primary teacher education in 2010 meant that each course had one coordinator and one online course site in the Moodle-based LMS to cater for multiple occurrences including campus, distance, and regional blended offerings (Davis, Mackey, McGrath, Morrow, Walker, & Dabner, 2010; Davis et al., 2011). The significant redevelopment of online course sites in 2010 and the associated growth in staff confidence and capability to adopt blended learning approaches were key factors in enabling the emergency response in February 2011. Even so, there is a very real difference between planned design for blended delivery and the rapid adaptations and innovations required to meet changing circumstances in disaster conditions. The literature review establishes the contribution of this research in preparing for, and understanding, the role of blended learning in times of crisis.

Literature

Blended Learning in Higher Education and its Use in Times of Crisis or Disaster

Online and blended learning strategies have contributed to a blurring of boundaries between distance and face-to-face learning, and institutions have become increasingly interested in the affordances of blended learning to complement and, in many cases, replace, traditional face-to-face delivery. Rationales for adopting blended learning include, among others, perceived economic efficiencies such as the ability to operate globally, supporting diversity through equity of access for students unable to attend regular classes, enhancing students' campus experiences especially in large classes, and pedagogical effectiveness through strategies such as increased interaction (Dziuban, Moskal, & Hartman, 2005; Sharpe, Benfield, Roberts, & Francis, 2006; Stacey & Gerbic, 2009). While most blended learning definitions assume a combination of online and face-to-face experiences (Osguthorpe & Graham, 2003), there are numerous interpretations of what constitutes blended learning (Stacey & Gerbic, 2009), resulting in an evolving understanding of what is, and can be, blended (Sharpe et al., 2006).

There is consensus that effective blended learning is much more than "an addition or a layering of technology, but a potentially transformative process" (Stacey & Gerbic, 2009, p. 3) that necessitates careful, thoughtful, and informed design. Successful blended learning programs often aspire to achieve goals such as pedagogical richness, access to knowledge, social interaction, personal agency, cost effectiveness, and ease of revision (Osguthorpe & Graham, 2003, p. 231). Mason (2000) agrees that blended learning is not simply a matter of providing online resources and content to supplement face-to-

face teaching, but that it "requires more careful design and support than traditional face-to-face teaching" (p. xiv).

Successful implementation of blended learning calls for faculty to actively engage in course design and to employ knowledge about how learning theory, pedagogy, content, and the use of technology can be combined to support blended learning experiences (Cross, 2006; Kanuka & Garrison, 2004). Garrison and Vaughan (2008, p. 5) suggest that effective blended learning integrates an optimal mix of oral and written communications and physical and virtual environments, taking into account the learners, context, and purpose of the learning scenario. In addition to effective design, students need to be well prepared with the skills and understandings to interact in blended modes and activities (Hamilton & Tee, 2010; Zaka, 2012).

The transformative potential of blended learning for initial teacher education has been well researched and acknowledged (see, for example, Davis et al., 2010, 2011; Geer, 2009; Simpson & Anderson, 2009). As in other tertiary education fields, these examples highlight the deliberate and intentional nature of planning, implementing, and evaluating for successful blended learning.

When institutions or program leaders consider the complex options for designing effective learning experiences, they are usually working within the parameters of known conditions and contexts. Little has been written about the implementation of blended learning in times of crisis or disaster, although it is recognized that blended learning provides access to education in situations where physical attendance is dangerous, difficult, or impossible (Bonk, Kim, & Zeng, 2006; Quinn, 2011). Distance education technologies can be appropriated within university disaster planning to provide resilient communication channels and access to learning opportunities in the event of unexpected disruption (Watkins, 2005). Institutional strategies should include off-site technology, infrastructures including web servers, business continuity plans, access for all staff and students, and preparing staff and students to engage in online teaching and learning (Watkins, 2005).

Research about e-learning in times of emergency is scarce and scattered, ranging, for example, from discussions on international standards in emergency education (Bromleya & Andinab, 2010) to healthcare education needs following Hurricane Katrina (Hoover, Dopson, & Drehobl, 2010). However, apart from recent examples from the University of Canterbury (Breeze, Buckley, & Gilmore, 2011; Buckley & Gilmore, 2011; Mackey, Breeze, Buckley, Dabner, & Gilmore, 2011a, 2011b; Monti, Tull, & Hoskin, 2011), there is very little research describing the implementation of blended learning in times of crisis or emergency where there is neither time nor resources for extensive design or redesign of existing strategies.

The Roles of Information Technology in Disaster and Crisis Situations

Beyond the education sector, there is a growing interest in the role of technology in times of natural disaster, civil unrest, emergencies, and crises. Such research falls into two broad categories: (1) the formal use of technology to support disaster planning, emergency response, and crisis information management (e.g., Schafer, Ganoe, & Carroll, 2007); and (2) the spontaneous appropriation of technology (including social media) to facilitate communication, information sharing, work practices, networking, and social interaction when normal channels are disrupted (e.g., Dabner, 2011). These categories may overlap as technology mediates interaction between formal and informal contexts, and between open public sites and official channels. In spite of the range of contexts, there are parallels for this study, particularly in relation to the ways in which individuals and groups improvise with digital tools to solve complex problems.

Emergencies present large, complex, and unique challenges – sometimes called "wicked problems" (Churchman, 1967) – which demand flexible and creative responses rather than the "well-learned behaviors or habitual responses" that often accompany first-response actions (Plotnik, Turoff, & Van Den Eede, 2009, p. 1). Plotnik et al. talk of "muddling through" wicked problems to describe the creative problem solving and improvisation that occurs in the midst of undefined and changing situations such as emergencies, noting that it is "important is to have in place the technology to support the philosophy of response best suited for flexibility and creativity" (Plotnik et al., 2009, p. 7). Flexibility, creativity, resourcefulness, and resilience are recurring themes, especially in relation to using technology to do things differently in crisis situations.

Research into crisis and disaster situations has shown that adversity can be the catalyst for new and enduring technology-enabled patterns, behaviors, and actions (Hagar & Haythornthwaite, 2005; Mark &

Semaan, 2008). Innovative uses of technology have provided resilient solutions to combat disruption and enable people to work, socialize, and communicate virtually by replacing face-to-face interaction with online interaction in times of crisis. These innovations often lead to structural and systemic changes as new ways of working and interacting are adopted, further enhancing the resilience of individuals and organizations to cope with new disruptions (Mark & Semaan, 2008). For example, during wars in Israel and Iraq, people increasingly used information technologies rather than traveling to physical workplaces by car (Mark & Semaan, 2008), and UK farmers turned to online networks during a prolonged outbreak of foot-and-mouth disease (Hagar & Haythornthwaite, 2005). In both cases, the crisis-induced change has influenced life beyond the immediate crisis. Willingness to use digital technologies is an important factor in enabling people to adapt creatively and flexibly to virtual environments when normal patterns are disrupted. Thus it is vital for organizations to prepare people to work in technology-enabled environments and to consider how strategies, protocols, and resources might support virtual work practices (Mark & Seeman, 2008).

There is also growing interest in the roles that online social networks play in generating and distributing information in crisis and emergency situations, enabling members of the public, the media, and authorized personnel such as emergency response teams to share information in advance, or in place of, formal communication channels. There are numerous recent examples of online discussions and social media supporting communities by providing information quickly and effectively, for example during the Sichuan earthquake (Qu, Wu, & Wang, 2009); the Victoria bushfires, Queensland floods, and Tropical Cyclone Yasi (Freeman, 2011); the Canterbury earthquakes (Dabner, 2011); and in emergencies like the Virginia Tech event (Palen, Vieweg, Liu, & Hughes, 2009).

In times of crisis, online social networking provides both benefits – for example, effective alerts, greater sense of community and support – and challenges – for example, quality, quantity, and reliability of information, and accessibility for those without Internet or mobile phones or who experience loss of services (Freeman, 2011; Shklovski, Palen, & Sutton, 2008). There is a sound argument, however, that the public generation and dissemination of information via social media can enable more agile responses and distributed problem solving than otherwise informed by conventional news and official channels (Palen et al., 2009, 2010).

Information technologies play important and evolving roles in times of crises when normal routines are disrupted. In our networked world, technologies enable alternative ways of working and communicating, and while there is a growing body of literature related to crisis contexts, there is a distinct lack of research considering the particular ways that technology facilitates formal learning in times of severe disruption.

Methods

Unexpected events prompted this study and necessitated a quick-response research (QRR) method (Quarantelli, 2002) to ensure emerging field and online data were collected relatively quickly while still current and accessible. QRR is not a methodology as such, but rather it reflects the adaptation of existing methods to suit unplanned events and condensed timeframes associated with crisis situations. QRR "is about understanding the meaning of exceptional events or daily events in exceptional circumstances from the perspectives of those being studied" (Michaels, 2003, p. 21). In QRR, researchers are usually under pressure to collect data before it disappears and/or before it is affected by rapidly changing circumstances (Michaels, 2003; Palen & Vieweg, 2008). Data sources may be less conventional in the sense that observations, informal interviews, newspaper articles, websites, and meetings may provide rich insights into the post-disaster period. Adopting a descriptive QRR approach (Michaels, 2003), this study began soon after the immediate crisis by drawing on the participants' lived and ongoing experiences, complemented by rich sources of online data.

All five authors of this paper were responsible for leading pre-service teacher education courses (or course modules) in the first semester for local, regional, and distance students. There were approximately 170-200 students enrolled in each course. While the authors knew each other, they came from different subject areas and brought complementary research interests to the project. The five authors all employed some blended teaching strategies, and some had considerable experience in developing and designing blended learning courses. All lost immediate access to their offices and physical resources on February 22, 2011, and they worked from their homes for several weeks before being relocated to temporary accommodation on campus. They gathered voluntarily to purposefully and systematically inquire, record, and reflect on their experiences in order to understand and improve practice and to build resilience. Cochran-Smith and Lytle (2009) stress the importance of university academics developing an inquiry-

centered approach to understand the effects their teaching may have on their students and on their own teaching beliefs and practices.

A reflective–narrative model enabled the authors to develop a descriptive account of "what it is like" (Cohen, Manion, & Morrison, 2007) to engage in blended learning in an emergency context. The narrative style of the research is also appropriate because, as Friesen (2009, p. 29) states, stories occur "when something goes wrong or when something out of the ordinary happens in the course of a day." The research connects the story to the present through the natural development of the research (Friesen, 2009), concluding with a set of questions to guide academic disaster planning. These findings emerged from a qualitative analysis through the lens of the participants (Cohen et al., 2007) within the particular context of emergency response.

The prime data source is the participants' narratives emerging as excerpts and findings from regular fortnightly meetings over a period of approximately six months, and from a series of autobiographical accounts reflecting on how they adapted course content and teaching in response to the changing context. Quotes are identified by the author's initials. The authors' regular meetings were, in essence, a series of co-constructed unstructured interviews in which participants questioned, discussed, and collectively analyzed their experiences. Rather than a formal process of questioning between a researcher-interviewer and participant-interviewee, the data collection process involved all five participant-researchers as conversational partners (Chase, 2005), shifting between their dual roles as both narrators and listeners. This approach was facilitated by their shared understandings as teacher educators, and the group meetings provided opportunities for critique from different perspectives. The authors used a thematic analysis to compare their narratives and to identify categories, links, and connections (LeCompte & Preissle, 1993, as cited in Mutch, 2005). The common themes that emerged from the narratives were *communication*, *learning design*, *community*, and *teaching and learning spaces* (Figure 1). These themes flowed across all phases with varying degrees of emphasis, as described later.

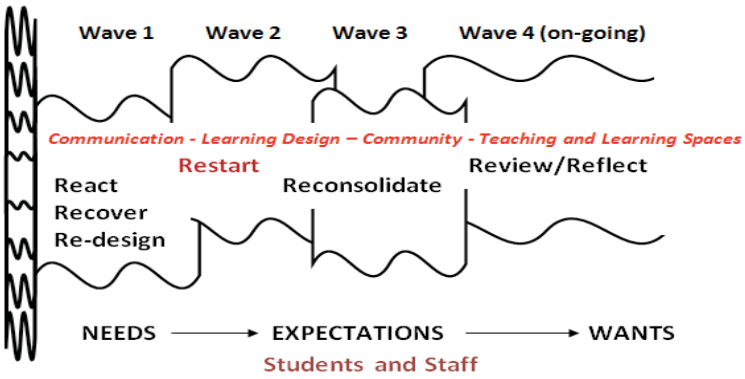

Figure 1. *Waves of response*

Data from the LMS (including examples of activities, forum postings, and resources) were used to inform, illustrate, and support the analysis. A detailed timeline was developed that compared the participants' experiences, responses, and activities at weekly intervals following February 22, 2011. The authors collectively distilled the key elements from the timeline into a diagrammatic representation to conceptualize the phases and activities that characterized their blended teaching and learning experiences (see Figure 1), and, as the project developed, the objectives of their research crystallized to describe how they had:

1) responded to the initial closure of the campus;
2) redesigned teaching, learning, and assessment opportunities to ensure equitable access and continuity for students in three different modes and locations, with a much greater reliance on online pedagogies for all students;
3) supported colleagues and students who were dealing with physically and emotionally challenging circumstances;
4) embedded changes into the program to ensure resilience in the event of future interruptions;

5) disseminated the learning of the research team to assist colleagues and other institutions/organizations in preparing for unexpected crises and natural disasters.

Findings

The findings describe the different phases of activity and some of the changes and innovations that occurred within different courses. The analysis of narratives and experiences identified three waves of post-disaster activity occurring during 2011; these phases informed and were followed by an ongoing phase of embedded change continuing into 2012 (see Figure 1). A detailed description of the activities and findings of each phase is provided elsewhere (Mackey et al., 2011b).

Phase 1: React, Recover, and Redesign

The first phase, spanning three weeks when the university was closed (February 22 to March 14), was characterized by initial reaction to the emergency situation followed by an intense period of recovery and redesign of online learning spaces and approaches prior to the recommencement of teaching. This phase was particularly stressful for staff as they juggled personal priorities such as locating family, colleagues, and students; providing food, support, and accommodation; working in emergency centers and suburbs needing practical help; and simultaneously turning their attention to how they might resume teaching in a disrupted scenario.

The biggest challenge during this phase was communication, and fortunately the university's technical infrastructure was not damaged. However, staff (and students) were variously affected by the damage to the city's infrastructure, with some having no power and/or telephone and Internet services. Many had left laptops in unsafe buildings, and those with services and computers found themselves sharing with partners, children, and extended family who were also unexpectedly working from home.

The September earthquake had taught the importance of referring staff and students to the official UC website for key communications, and had revealed that online social networks played an important role in relaying information. Accordingly, updates were published at least daily on the official UC website, a dedicated UC Facebook site provided a hub of interaction (Dabner, 2011), and program coordinators began posting news items (and automatic e-mails) to students via the LMS. While it was impossible to know how many students were missing vital information, the feedback confirmed that, rather than there being a lack of communication, some students were at times overwhelmed with the number of LMS and e-mail messages.

The academic priority during this phase was responding to the urgent need to redesign courses to ensure some form of teaching could begin as soon as possible. Detailed redesign examples are described by Buckley and Gilmore (2011) and by Mackey et al. (2011a, 2011b). The key factors that impacted upon this activity included:

- the timing of the disruption (very few lecturers had met their classes for the first time, and there had been no time to establish relationships);
- the fact that the whereabouts and capacity of students were unknown (with a realistic assumption that many were emotionally and physically affected);
- the limited capacity for on-campus teaching (many buildings would be unavailable for several months, and some indefinitely);
- the inability of staff to access physical teaching resources in offices and classrooms;
- the reduction of the duration of the first semester to one that was shorter than planned, with teaching and assessment needing to be adjusted accordingly;
- the need to cater for diverse groups including on-campus students, regional campus students in Nelson and Rotorua (who were not directly affected by the earthquakes and who were ready for a normal study program), and students studying by distance (but who had been on campus for orientation when the earthquake occurred);
- the lack of preparation of first-year students for online study (LMS and ICT orientation sessions were due to begin within minutes of the earthquake);

- the fact that current blended learning strategies were such that they were customized for the different cohorts, and that the additional resources (CD-ROMs and DVDs) provided to distance students were not immediately available to on-campus students;
- the lack of clarity around how many students would be able to access online resources and content.

In short, these factors presented a "wicked problem" of the sort noted by Plotnik et al. (2009), which demanded flexibility, creativity, and innovation to address. Staff had a very condensed timeframe (approximately one week) within which to plan, create, prepare, and launch a flexible online program. They relied heavily on electronic resources, and were grateful for support received from the regional campus staff as well as other universities and organizations (including curriculum resources from the Ministry of Education) and the generous provision of electronic materials to the Library. Understandably, the authors adopted a variety of redesign strategies depending on the courses they taught, their existing online and blended pedagogies, the accessibility of resources, and their individual teaching styles. However, significant redesign was undertaken by all five of them. One of them (DB) described his course redesign as follows:

> *"I began a review of the maths modules within Learn [LMS] to determine the extent to which additional resources and learning activities would be required to enable the course to be taught without face-to-face lectures. The initial focus was on the redesign of the lectures and tutorials for the first five weeks of the course. Our first step… was to ensure all students had access to all distance learning materials – the study guide CD-ROM and the video recordings of children modelling the numeracy strategy stages and children undergoing numeracy assessment interviews on DVD. The second step was to redesign the modules to include the capture of lectures which were then made available online. These lectures were the platform on which subsequent learning experiences and tutorials were based. Our initial response was to reduce the amount of information transmission in each session and replace it with practice and/or application activities. In some instances lectures became self-directed learning experiences within Learn – supporting students to locate, engage with and evaluate web-based resources."*

Throughout this phase, communication remained a priority, as students needed information and reassurance that their courses would go ahead. As well as distributing news via the LMS and e-mail, one group of lecturers used a flip video to record an impromptu introduction while they were meeting together in someone's home. This elicited a warm response from students, who appreciated the "real people" talking to them. Positive leadership and strong online presence were needed prior to the course beginning: *"we needed to be there in multiple ways… The Learn site became the course place so the facilitator's voice needed to be present, steady and constant"* (PB).

Phase 2: Restart

The second phase, lasting approximately four weeks, marked the restart of teaching. This was a demanding time where relationships between staff and students, and between students, were established, and alternative pedagogies and technologies were adopted. This phase focused on meeting students' needs within the physical restraints imposed by lack of facilities, and the wider context of post-quake stress. Some courses were launched in fully online mode, while others blended online learning with on-campus sessions in tents and safe venues. Physical spaces were scarce, and online pedagogies were essential for "restart" teaching where virtual classrooms provided not just content delivery, but also a place for students to interact and ask questions. Later reflections on teaching strategies indicated that, to varying degrees, the authors had intuitively adopted an inverted (Lage, Platt, & Treglia, 2000) or "flipped classroom" model (Bergmann & Sams, 2012; Fulton, 2012) requiring students to take greater responsibility for their own learning, and using any contact time for interaction. Precious face-to-face time was reserved for workshops, hands-on activities, and discussions to explore what had been presented online. The online environment provided course content supported by new multi-modal resources including podcasts and video demonstrations.

The key challenge of this phase was the need to provide a supportive and reassuring learning environment for a large group of fragile and dispersed students. Many students had opted into "flexible mode" out of necessity but were unprepared for independent learning and were feeling overwhelmed by their circumstances. While the flexibility suited some students, others were unhappy because they had not enrolled for online study and would have much preferred face-to-face contact for all classes. Staff

recognized that the online environment needed to promote interaction, connections, and a sense of community. FG described her experience as follows:

> *"I deliberately tried to utilize the LMS as a teaching site which would require active participation from the students and which forced them to engage not only with me but with each other. For example, I set up a link to Google Docs, in which all students had to add in a synopsis of their readings. Once all had added their entry they completed a synthesis in pairs which was posted for all to view, compare and contrast. Discussion forums were set up, especially for the first assignment, for all questions and discussion. This helped us to build a learning community within the virtual world. It reemphasized the social construction of knowledge, and how we all needed to take a responsibility within this process."*

The restart was a very intense period as *"teaching then began to span seven days* [a week]*, with messages and questions appearing daily that needed a timely response"* (ND). Staff recognized the importance of being visible in the online spaces and responding promptly to students' questions. They identified practical strategies for supporting students, including streamlining and simplifying online course sites, revising course maps and outlines, highlighting course changes, providing additional resources (particularly for technical aspects like creating e-portfolios), adjusting assessment tasks and assessment dates, posting and e-mailing regular updates, and personally following up with students who had yet to access the relevant online course sites. Intense work in the online sites helped to foster a sense of community among students. ND noted how her students (12 groups of 17 students) began relating to one another through discussions about visual art, sharing work and taking *"ownership of their question forum, offering answers at times before staff and also providing encouragement and support"*.

This was also a challenging period as staff began to implement new approaches, sometimes with unfamiliar technologies. It was evident that they developed their own support networks to problem solve and build capacity, including technical understanding of features or tools that were previously unknown to them. For example, FG described her experience of networking with colleagues for support:

> *"Very soon, quite unconsciously… I established a brand new network of people across curriculum areas and outside my immediate teaching team. None of these people were designated as the "technical experts" within blended learning course design, but they were able to assist in problem solving and shared a similar enthusiasm to create an engaging and stimulating virtual classroom for our students."*

Among the authors, there was a consensus that professional conversations and the insider knowledge associated with professional communities (Lieberman & Miller, 1999) provided sustained support during this period. For example, FG noted that interactions were deliberately focused on solving teaching-related problems, and that:

> *"Conversations were short but direct and were based on effective pedagogy as we moved forward, questioning ourselves and each other. They were personalized and fulfilling as I grew in confidence supported by a team of learners, bouncing ideas off each other. I could even support and help others… it was quite an empowering process as I felt challenged as a real learner, which had a direct connection to my classroom and the very real dilemmas of my teaching."*

Phase 3: Reconsolidate

The third phase corresponded with the second half of the first semester, and it commenced after a shortened term break. This phase was characterized by uncertainty (including two more significant earthquakes of magnitudes 5.6 and 6.3, resulting in another evacuation and campus closure for a week just prior to the mid-year exam period) and weekly timetabling changes as teaching spaces became available, allowing more face-to-face classes. Unsurprisingly, attendance was erratic as many students, particularly those living in badly affected suburbs, were coping with the ongoing impact of the earthquakes. Roads were badly damaged, public transport operated on limited schedules and routes, and heavy traffic flows were compressed into suburbs where businesses had relocated and retailers were open. Furthermore, many students and their families had left town at least temporarily to escape the ongoing unsettling aftershocks. The academic response was to adopt a relaxed approach to attendance, and to encourage students to manage their own blend of learning experiences by opting into campus or online classes depending on their circumstances and irrespective of their official course enrollment status.

Staff maintained strong communication within their course sites, and they encouraged and monitored student participation. The challenge for some students was the need for them to work more independently in difficult circumstances, and some were unable to manage their time successfully. Students had to be proactive in checking LMS sites and e-mails regularly to receive the latest timetable and course information. It was absolutely critical to supply clear weekly overviews for each course to guide students through the options that were available.

The shortened semester, adjustments to course content, and different teaching strategies also had an impact on planned course schedules and assessment. Assessment tasks were revised to accommodate the varied circumstances of on-campus, regional, and distance students. The aftershocks on June 13 prompted a university-wide move to replace exams and tests with take-home or online tests/assignments so as to avoid having to have large numbers of students sitting in lecture theatres. The authors and their colleagues were already using a variety of alternative assessment strategies for distance students, and these were adapted for use with the on-campus cohort.

Phase 4: Review and Reflect

The final phase represents the ongoing process of embedding resilient changes into the teaching programs to ensure staff and students are well equipped for any future interruptions. Many earthquake-induced changes have been embraced by staff and students, for example the use of Adobe Connect to provide interactive tutorials, the planned distribution of resources to all cohorts regardless of study mode, and a much greater convergence between on-campus and distance cohorts.

Discussion

Creative and innovative solutions are required if a sound academic program is to be maintained when faced with a lack of space and physical resources, interrupted schedules, dispersed students, and an extended period of civil emergency. As others have found in different contexts (Hagar & Haythornthwaite, 2005; Mark & Semaan, 2008; Plotnik et al., 2009), disasters can prompt new ways of working and interacting to combat the constraints of crisis conditions. Increasingly, technology is becoming a critical enabler to enable people to work, socialize, and communicate and, in this case, to continue to teach and learn. However, as Mark and Semaan note, there must also be a willingness and capability to adopt digital solutions, and in an educational context this applies to students as well as staff. It is clear that students need to be well prepared for blended learning, and that the teacher's role is critical in supporting students, whether in face-to-face, online, or blended scenarios (Hamilton & Tee, 2010). The major difficulty in this disaster context was the lack of opportunity to prepare first-year students for blended learning prior to the need for them to engage in this mode, and the associated complications of offering that preparation and support in fully online mode.

The traumatic events of 2011 have prompted many changes in the ways that teacher educators at UC use blended learning strategies. What was evident from the authors' experiences and from their observations and interactions with colleagues was that emergency-response innovations occurred at the grassroots level, with course coordinators and lecturers taking control of redesign processes using whatever resources and assistance they could muster. This was challenging and stressful for some staff "because [innovation] involves disturbing the established routines through which individuals and groups perform and continuously reaffirm their identity" (Somekh. 2007, p. 2). Disrupted routines can lead to new ways of working and communicating (Hagar & Haythornthwaite, 2005; Mark & Semaan, 2008). In this case, the catalysts for increased adoption of blended learning were the lack of physical teaching spaces and the problems that had to do with assembling large numbers of students in tents and other unconventional or ad hoc teaching venues.

Seemingly small dilemmas of practice, such as how to host a literacy course book club activity in an online format, prompted meaningful professional dialogue about the possibilities of online learning. These conversations signaled the start of important pedagogical shifts as teaching teams, including some members who were previously ambivalent about online learning, began to explore how LMS features could support authentic and meaningful experiences for students (Mackey et al., 2011b). For example, the book club activity was easily accommodated in an online forum and proved equally successful to – if not more successful than – its original face-to-face version, as it gave rise to higher levels of interaction between groups of students and greater visibility of the discussion to staff members. This particular change also illustrated the blending of different cohorts irrespective of their official study mode, as the online activity catered seamlessly for on-campus, regional, and distance students. As Hagar and

Haythornthwaite (2005) and Mark and Semaan (2008) found, necessity may drive innovation, but many crisis-induced changes are subsequently embedded and integrated into normal practice. In this case, the changes have improved learning experiences for students and will enhance future academic resilience.

Conclusion and Recommendations

This paper addresses the realities of implementing and adapting blended learning "on the fly" in times of unexpected adversity and crisis. This is not "business as usual" or "teaching as planned," but highlights the potential of responsive blended pedagogies to provide access to continued learning opportunities and enable student engagement in an extreme context. This case study describes the challenges faced by academic staff and provides considerations for disaster planning at a course and program level in addition to the business continuity planning undertaken at an institutional level. The concluding points assume that organizational understanding and capability for blended and online learning already exists, along with appropriate infrastructure as well as technical and student support mechanisms to facilitate its use. In spite of having those essential elements in place, the experience of the authors identified critical areas for contingency planning, and they offer the questions below to assist others in preparing for unexpected disruptions. The main recommendation emerging from this study is that academic leaders need to be prepared for unanticipated interruptions. The questions that follow are intended to assist leaders in evaluating and improving the resilience of their academic programs by highlighting key areas in relation to sustaining equitable experiences for students in times of crisis.

Identify and Maintain Resilient Communication Channels

- What channels (including online social networks) are available for communications with staff and students?
- Do staff and students know about, and feel confident accessing, these channels?
- Are these channels likely to remain viable in disaster or emergency conditions?
- Do you have access to simple technologies you could use to create instant communications and resources for students (e.g., flip videos, podcasting)?
- What protocols and guidelines exist to ensure consistent and clear communications?

Prepare Staff in Advance to Use Blended Learning Strategies

- How well prepared are staff to implement blended or online strategies independently within a short timeframe?
- What professional development and support do you need to initiate now to ensure staff have the technological capability and the pedagogical understanding to work predominantly in an online or blended mode should the need arise?
- Do staff know how to access files, applications, and other resources remotely?

Prepare Students to Work Independently and Online

- How well prepared for independent learning would your students be if your institution had to shift all teaching and learning into a distance, flexible, or online mode at short notice?
- What additional supports or resources might students need in order to continue their learning activities independently?
- Could students complete alternative location-independent assessment activities, if necessary?

Ensure Resources are Readily Accessible in Alternative Formats

- In the event of a sudden and extended evacuation from your premises, how will you access the materials you require to continue teaching?
- How many of these resources are electronic?
- How might you utilize cloud computing to ensure continued access should your institution's infrastructure and servers be damaged?
- In what ways could the Library provide online support and access to course resources?

- Do you have adequate off-site backup and disaster recovery plans for electronic material?
- What physical resources do you need to digitize, or to arrange alternative access to (e.g., off-site copies, mutual arrangements with another institution) for you and your students?

References

Bonk, C. J., Kim, K., & Zeng, T. (2006). Future directions of blended learning in higher education and workplace learning settings. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 550-567). San Francisco, CA: Pfeiffer.

Bergmann, J., & Sams, A. (2012, May). Flipping the classroom. *Tech & Learning*, 42-43. Retrieved from http://www.techlearning.com/features/0039/flipping-the-classroom/52462

Breeze, D., Buckley, P., & Gilmore, F. (2011) Challenging perceptions of blended learning in an adverse learning context. In G. Williams, P. Statham, N. Brown, & B. Cleland (Eds.) *Changing demands, changing directions. Proceedings of the 28th ASCILITE Conference* (pp. 179-181). Hobart, Australia: University of Tasmania. Retrieved from http://www.ascilite.org.au/conferences/hobart11/downloads/papers/Breeze-poster.pdf

Bromleya, P., & Andinab, M. (2010). Standardizing chaos: A neo-institutional analysis of the INEE Minimum Standards for Education in Emergencies, Chronic Crises and Early Reconstruction. *Compare, 40*(5), 575–588. doi:10.1080/03057920903254972

Buckley, P., & Gilmore, F. (2011) Tackling technology: A study of teacher educators as they develop a web-based teaching approach. In J. Mackey, N. Dabner, N. Davis, & J. Johnson (Eds.), *Proceedings of ULearn 2011 – Research Stream* (pp. 10-15). Christchurch, New Zealand: School of Literacies and Arts in Education, University of Canterbury. Retrieved from http://ulearn.core-ed.org/sites/core-ed.org/files/ULearn_Conference_Proceedings.pdf

Chase, S. E. (2005). Narrative inquiry: Multiple lenses, approaches, voices. In N. K. Denzin & Y. S. Lincoln (Eds.), *The handbook of qualitative research* (3rd ed., pp. 651-679). Thousand Oaks, CA: Sage.

Churchman, C. W. (1967). Guest editorial: Wicked problems. *Management Science, 14*(4), 141-142. doi:10.1287/mnsc.14.4.B141

Cochran-Smith, M., & Lytle, S. L. (2009). *Inquiry as stance: Practitioner research for the next generation*. New York, NY: Teachers College Press.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). London, UK: Routledge.

Cross, J. (2006). Foreword. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. xvii-xxiii). San Francisco, CA: Pfeiffer.

Dabner, N. (2011). "Breaking ground" in the use of social media: A case study of a university earthquake response to inform educational design with Facebook. *The Internet and Higher Education, 15*(1), 69-78. doi:10.1016/j.iheduc.2011.06.001

Davis, N., Dabner, N., Mackey, J., Walker, L., Hunt, A. M., Breeze, D., Morrow, D., Astall, C., & Cowan, J. (2011). Converging offerings of teacher education in times of austerity: Transforming spaces, places and roles. In M. Koehler & P. Mishra (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2011* (pp. 224-229). Chesapeake, VA: Association for the Advancement of Computing in Education. Retrieved from Ed/ITLib Digital Library. (36263)

Davis, N., Mackey, J., McGrath, A., Morrow, D., Walker, L., & Dabner, N. (2010). Blending online and on-site spaces and communities: Developing effective practices. In D. Gibson & B. Dodge (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2010* (pp. 2696-2698). Chesapeake, VA: Association for the Advancement of Computing in Education. Retrieved from Ed/ITLib Digital Library. (33778)

Dziuban, C., Moskal, P., & Hartman, J. (2005). Higher education, blended learning and the generations: Knowledge is power – no more. In J. Bourne & J. C. Moore (Eds.), *Elements of quality online education: Engaging communities* (pp. 85-100). Needham, MA: The Sloan Consortium.

Freeman, M. (2011). Fire, wind and water: Social networks in natural disasters. *Journal of Cases on Information Technology, 13*(2), 69-79. doi:10.4018/JCIT.2011040105

Friesen, N. (2009). *Re-thinking e-learning research: Foundations, methods and practices*. New York, NY: Peter Lang.

Fulton, K. (2012). The flipped classroom: Transforming education at Byron High School. *T.H.E. Journal, 39*(3), 18-20. Retrieved from http://www.thejournal.com/articles/2012/04/11/the-flipped-classroom.aspx

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco, CA: Jossey-Bass.

Geer, R. (2009). Strategies for blended approaches in teacher education. In E. Stacey & P. Gerbic (Eds.), *Effective blended learning practices: evidence-based perspectives in ICT-facilitated education* (pp. 39-61). Hershey, PA: Information Science Reference. doi:10.4018/978-1-60566-296-1.ch003

Hagar, C., & Haythornthwaite, C. (2005). Crisis, farming & community. *The Journal of Community Informatics, 1*(3), 41-52. Retrieved from http://www.ci-journal.net/index.php/ciej/article/download/246/211

Hamilton, J., & Tee, S. (2010). *Teaching and learning: A blended learning systems approach*. Unpublished manuscript. Retrieved from http://eprints.jcu.edu.au/14864/1/HERD_2010_Biggs.pdf

Hoover, D. M., Dopson, S., & Drehobl, P. (2010). Working with local, state and federal partners to address health education needs of Hurricane Katrina evacuees in Houston: A CDC Case Study. *American Journal of Health Education, 41*(2),124-126.

Kanuka, H., & Garrison, D. R. (2004). Cognitive presence in online learning. *Journal of Computing in Higher Education, 15*(2), 30-48. doi:10.1007/BF02940928

Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education, 31*(1), 30-43. doi:10.1080/00220480009596759

Lieberman, A., & Miller, L. (1999). *Teachers transforming their world and their work*. New York, NY: Teachers College Press.

Mackey, J., Breeze, D., Buckley, P., Dabner, N., & Gilmore, F. (2011a). Innovate to survive: Being prepared to teach in times of crisis. In J. Mackey, N. Dabner, N. Davis, & J. Johnson (Eds.), *Proceedings of ULearn 2011 – Research Stream* (pp. 56-65). Christchurch, New Zealand: School of Literacies and Arts in Education, University of Canterbury. Retrieved from http://ulearn.core-ed.org/sites/core-ed.org/files/ULearn_Conference_Proceedings.pdf

Mackey, J., Breeze, D., Buckley, P., Dabner, N. & Gilmore, F. (2011b). Riding the seismic waves: Re-blending teacher education in response to changing demands. In G. Williams, P. Statham, N. Brown, & B. Cleland (Eds.) *Changing demands, changing directions. Proceedings of the 28th ASCILITE Conference* (pp. 829-839). Hobart, Australia: University of Tasmania. Retrieved from http://www.ascilite.org.au/conferences/hobart11/downloads/papers/Mackey-full.pdf

Mark, G., & Semaan, B. (2008). Resilience in collaboration: Technology as a resource for new patterns of action. In B. Begole & D. W. McDonald (Eds.), *Proceedings of the 2008 ACM conference on Computer Supported Cooperative Work* (pp. 127-136). New York, NY: Association for Computing Machinery. doi:10.1145/1460563.1460585

Mason, R. (2009). Foreword. In E. Stacey & P. Gerbic (Eds.), *Effective blended learning practices: Evidence-based perspectives in ICT-facilitated education* (pp. 62-78). Hershey, PA: Information Science Reference.

Michaels, S. (2003). Perishable information, enduring insights? Understanding quick response Research. In J. Monday (Ed.), *Beyond September 11th: An account of post-disaster research* (pp. 15-48). Boulder, CO: Natural Hazards Research and Applications Information Center.

Monti, A., Tull, S., & Hoskin, A. (2011). Engagement at the epicentre. In G. Williams, P. Statham, N. Brown, & B. Cleland (Eds.) *Changing demands, changing directions. Proceedings of the 28th ASCILITE Conference* (pp. 874-879). Hobart, Australia: University of Tasmania. Retrieved from http://www.ascilite.org.au/conferences/hobart11/downloads/papers/Monti-concise.pdf

Mutch, C. (2005). *Doing educational research: A practitioner's guide to getting started*. Wellington, New Zealand: New Zealand Council for Educational Research.

Needham, V., Hunt, A. M., & McMurray, L. (2011). Exploring a culturally-sensitive blend of initial teacher education for Rotorua schools: Online on a regional campus with Māori. *Computers in New Zealand Schools, 23*(3), 201-226. Retrieved from http://education2x.otago.ac.nz/cinzs/mod/resource/view.php?id=241

Osguthorpe, R., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *Quarterly Review of Distance Education, 4*(3), 227-233.

Palen, L., Anderson, K. M., Mark, G., Martin, J., Sicker, D., Palmer, M., & Grunwald, D. (2010). A vision for technology-mediated support for public participation & assistance in mass emergencies & disasters. *Proceedings of the 2010 ACM-BCS Visions of Computer Science Conference*. Swinton, UK: British Computer Society.

Palen, L., & Vieweg, S. (2008). The emergence of online widescale interaction in unexpected events: Assistance, alliance and retreat. In B. Begole & D. W. McDonald (Eds.), *Proceedings of the 2008 ACM conference on Computer Supported Cooperative Work* (pp. 117-126). New York, NY: Association for Computing Machinery. doi:10.1145/1460563.1460583

Palen, L., Vieweg, S., Liu, S. B., & Hughes, A. L. (2009). Crisis in a networked world: Features of computer-mediated communication in the April 16, 2007, Virginia Tech Event. *Social Science Computer Review, 27*(4), 467-480. doi:10.1177/0894439309332302

Plotnick, L., Turoff, M., & Van Den Eede, G. (2009). Re-examining threat rigidity: Implications for design. In R. H. Sprague, Jr. (Ed.), *Proceedings of the 42nd Hawaii International Conference on System Sciences*. Los Alamitos, CA: IEEE Computer Society. doi:10.1109/HICSS.2009.365

Qu, Y., Wu, P. F., & Wang, X. (2009). Online community response to major disaster: A study of Tianya Forum in the 2008 Sichuan earthquake. In R. H. Sprague, Jr. (Ed.), *Proceedings of the 42nd Hawaii International Conference on System Sciences*. Los Alamitos, CA: IEEE Computer Society. doi:10.1109/HICSS.2009.330

Quarantelli, E. L. (2002). The Disaster Research Center (DRC) field studies of organized behavior in the crisis time period of disasters. In R. A. Stallings (Ed.), *Methods of disaster research* (pp. 94-126). Philadelphia, PA: Xlibris.

Quinn, R. D. (2011). E-learning in art education: Collaborative meaning making through digital art production. *Art Education, 64*(4), 19-24.

Schafer, W. A., Ganoe, C. H., & Carroll, J. M. (2007). Supporting community emergency management planning through a geocollaboration software architecture. *Computer Supported Cooperative Work, 16*(4-5), 501-537. doi:10.1007/s10606-007-9050-7

Sharpe, R., Benfield, G., Roberts, G., & Francis, R. (2006). *The undergraduate experience of blended e-learning: A review of UK literature and practice*. York, UK: The Higher Education Academy. Retrieved from http://www.heacademy.ac.uk/assets/York/documents/ourwork/teachingandresearch/Sharpe_Benfield_Roberts_Francis.pdf

Shklovski, I., Palen, L., & Sutton, J. (2008). Finding community through information and communication technology during disaster events. In B. Begole & D. W. McDonald (Eds.), *Proceedings of the 2008 ACM conference on Computer Supported Cooperative Work* (pp. 127-136). New York, NY: Association for Computing Machinery. doi:10.1145/1460563.1460584

Simpson, M., & Anderson, B. (2009). Redesigning initial teacher education. In E. Stacey & P. Gerbic (Eds.), *Effective blended learning practices: evidence-based perspectives in ICT-facilitated education* (pp. 62-78). Hershey, PA: Information Science Reference. doi:10.4018/978-1-60566-296-1.ch004

Somekh, B. (2007). *Pedagogy and learning with ICT: Researching the art of innovation*. London, UK: Routledge.

Stacey, E., & Gerbic, P. (Eds.). (2009). *Effective blended learning practices: Evidence-based perspectives in ICT-facilitated education*. Hershey, PA: Information Science Reference. doi:10.4018/978-1-60566-296-1

Watkins, R. (2005). Distance education's role in university disaster planning. *Distance Learning, 2*(6), 31-33.

Zaka, P. A. (2012). *Blended teaching and learning in a New Zealand rural secondary school: Using an ecological framework*. (Unpublished Master's thesis). Retrieved from University of Canterbury. Retrieved from http://ir.canterbury.ac.nz/bitstream/10092/7011/1/thesis_fulltext.pdf